

cause of abolition. Indeed, like his brother Joshua Young, D.D. (ostracised from his church at Burlington, Vermont, for officiating at John Brown's funeral<sup>1</sup>), Aaron became too vociferous on the subject of abolition for his own welfare, even in Maine, and found it advantageous to move to New Brunswick.

With the outbreak of the civil war, his friend Hannibal Hamlin secured for him a consulate at Rio Grande do Sul, Brazil, which he held under Presidents Lincoln, Johnson and Grant. There Aaron Young found a large field of usefulness suited to his temperament, spending his time and even money in attending the suffering and needs of the hosts of refugees from the Southern States, in attempting to induce development of the natural resources of the country, in laboring for the improvement of the river and harbor at that port, and collecting a wealth of material for the Smithsonian Institution.<sup>2</sup>

SOCIETY OF NATURAL HISTORY,  
Portland, Maine.

---

A PRE-KANSAN RECORD OF *PICEA CANADENSIS*  
FROM MISSOURI<sup>3</sup>

ETHEL B. HANSEN

Plate 323

A PIECE of wood obtained from a coal mine in Macon County, Missouri, has added a new species to the interglacial flora of that state.

Preglacial erosion, especially in the territory bordering the Middle Fork in Macon County, Missouri, cut down in places sufficiently far to remove even the Bevier bed of coal. Clays, containing pebbles and overlain by drift varying in thickness up to 100 feet, now occupy the coal horizons (6). A diagram of shaft No. 24 of the Central Coal and Coke Company in Macon County is shown in FIG. 1. The strata, including the Bevier coal seam, have been cut through by preglacial erosion to a hard limestone below. At a point marked "X" the wood under consideration was found. This wood covered by Kansan till and occupying the place where the Bevier seam formerly was, is believed to be pre-Kansan or Aftonian in age.

<sup>1</sup> 1903: Crawford, *Romance of Old New England Churches*, Boston, L. C. Bodge & Co. p. 322.

<sup>2</sup> See *Commercial Relations of the U. S. for 1864, 1866 and 1871*.

<sup>3</sup> Papers from the Department of Botany and Herbarium of the University of Michigan No. 425.

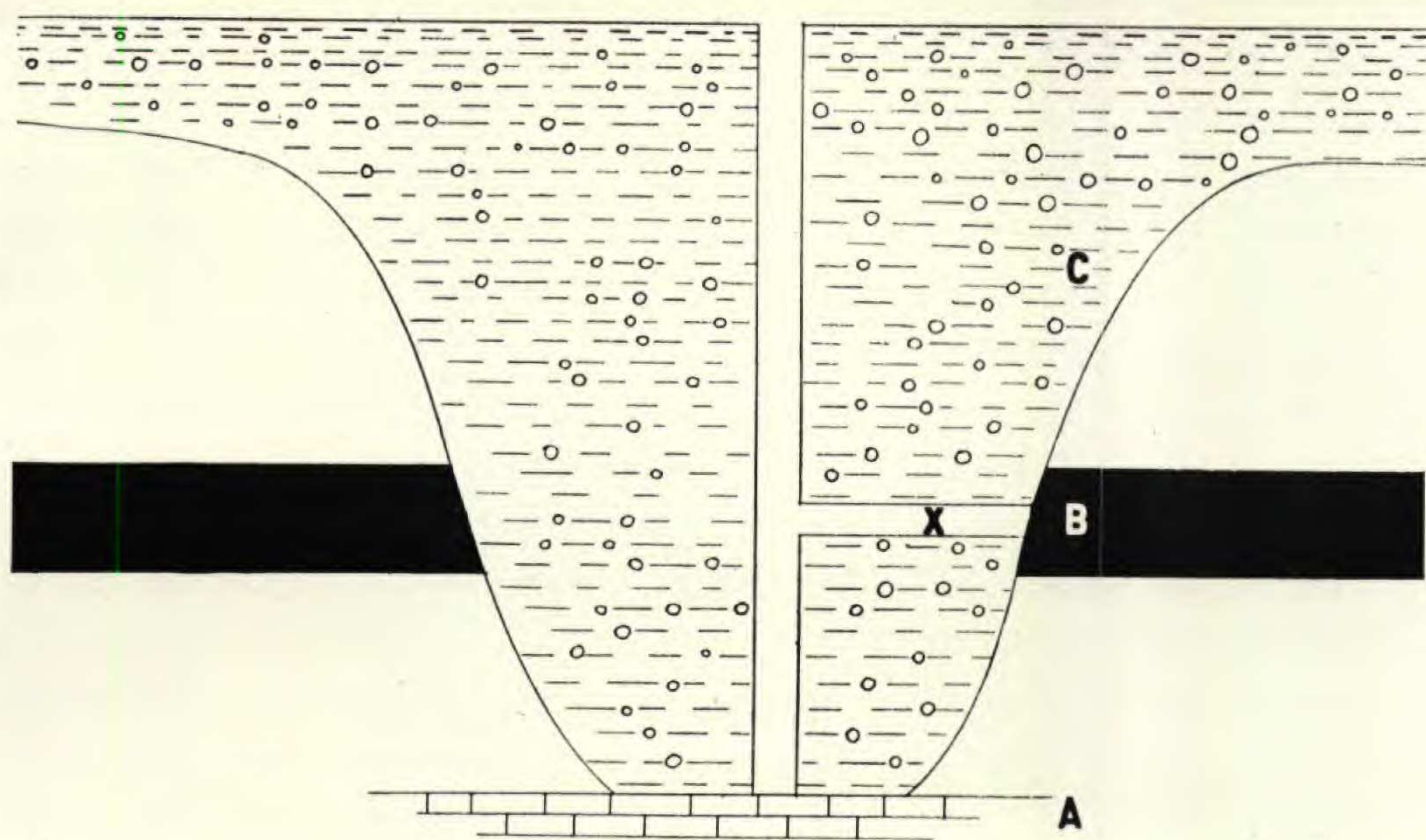


FIG. 1. Shaft No. 24, Central Coal & Coke Co.

The correct identification of fossil wood is attended with much difficulty due to the fact that not only color, odor, and the bark are usually missing but the cells are often badly crushed and fungal hyphae, spores, and mineral deposits obscure diagnostic features. After a careful microscopic examination of the wood (PLATE I), and comparison with known species, it was identified as *Picea canadensis* (Mill.) BSP. This species, has been found previously in the Pleistocene at Scarborough Heights, Ontario, Canada (9), and at Bloomington, Illinois (5).

In Missouri, Aftonian deposits have furnished fresh-water shells and the remains of mammals but the data concerning plant fossils have been very deficient. Broadhead (3) as early as 1870 reported sticks of wood found at a depth of 75 feet, and part of a grape vine at 40 feet in northern Missouri.

The same author (4) reported wood found in Daviess County; a grape vine and elm stick at a depth of 35 feet, a walnut log at a depth of 40 feet, and a pine log 6 feet in diameter at 70 feet. McGee (8) mentioned a forest bed 9 feet in thickness and 120 feet beneath the surface of the ground in Harrison County.

Baker (2) after making a careful study of the flora and fauna of the Aftonian period believes that there is evidence for a succession of two climates, (a) a warm, moist, temperate climate which favored luxuriant forests and such animals as the horse, elephant, and peccary and (b) a cold temperate climate in which a boreal flora flourished. Low-

lands and uplands, as today, furnished different habitats for plants and animals.

It is indeed fortunate that a single specimen of wood found in a coal mine has proved to be a species of definite climatic significance. The trees, shrubs, and herbs which were associated with *Picea canadensis* in making up the flora of the pre-Kansan period are as yet unknown. However, it is hoped that an opportunity may be presented for systematic collecting by a trained botanist at the site of an excavation or the sinking of a mine shaft which exposes a forest bed or fossil material. A collection made in such an exposure may give the investigator access to a whole florula.

Since *Picea canadensis* is limited in its southern extent by dryness and heat, it probably grew only during the period of boreal climate in northern Missouri. Its range extending as it does from Labrador northwestward nearly to the Arctic Sea is distinctly boreal. Its southern limits are southern Maine, northern New Hampshire, New York, shores of Saginaw Bay in Michigan, northern Wisconsin, and Minnesota (10).

It is interesting to note that the seedlings of *Picea canadensis* are light-tolerant and therefore pioneers in contrast to the shade-tolerant seedlings of climax forest trees (7). This spruce, limited in its southern extension by temperature, may have been an outlier on the frontier of the forest before the invading Kansan ice sheet.

#### SUMMARY

*Picea canadensis* (Mill.) BSP. has been found in northern Missouri and is considered to be pre-Kansan or Aftonian in age.

The presence of this species definitely indicates a boreal climate during part of the Aftonian interglacial period.

Acknowledgements are due to Wm. Harkes, General Superintendent of the Central Coal and Coke Company, Kansas City, Missouri, for sending the specimen of wood with data and a sketch of their mine shaft, and also to Dr. Frank Leverett, Dr. H. H. Buehler, and Professor E. B. Branson for their opinions as to the age of the wood.

UNIVERSITY OF MICHIGAN.

#### LITERATURE CITED

1. Bain, H. F. Geology of Decatur County. Iowa Geol. Surv., 8: 290. 1898.
2. Baker, Frank C. The Life of the Pleistocene or Glacial Period. Univ. Ill. Bull., Vol. 17, no. 41, 244-245. 1920.

3. Broadhead, G. C. Quaternary Deposits. *Amer. Nat.* **4**: 61–62. 1871.
4. ———. Report of Geological Survey of the State of Missouri, including Field Work of 1873–1874, 313–314. 1873–74.
5. Dawson, Sir Wm. and Penhallow, D. P. On the Pleistocene Flora of Canada. *Geol. Soc. Amer. Bull.*, **1**: 333. 1890.
6. Hinds, Henry. The Coal Deposits of Missouri. *Mo. Bur. Geol. Min.*, (2) **11**: 293. 1912.
7. Hutchinson, A. H. Limiting Factors in Relation to Specific Ranges of Tolerance of Forest Trees. *Bot. Gaz.*, **66**: 474. 1918.
8. McGee, W. J. Notes on the Geology of Macon County, Missouri. *Trans. St. Louis Acad. Sci.*, **5**: 317. 1888.
9. Penhallow, D. P. The Pleistocene Flora of the Don Valley. *Brit. Assoc. Rep.*, **70**: 338. 1900.
10. Sargent, Charles S. *Manual of the Trees of North America*. Houghton Mifflin Company, New York. 38. 1926.

## EXPLANATION OF PLATE 323

Transverse section of *Picea canadensis* found in coal mine in Macon County, Missouri,  $\times 150$ .

---

BETTER HERBARIUM SPECIMENS.—Prof. J. Franklin Collins' article<sup>1</sup> under this title, advocating the use of sheets of sponge rubber as cushions in the plant press to equalize pressure and secure well-dried leaves and flowers borne on thick branches and stems or in close proximity to large fruits, calls to mind a very simple practice I have followed for several years which seems to offer certain advantages over the use of sponge rubber. It consists merely in inserting in each folder of such specimens, as the plants are put into the press, sheets of newspaper folded into appropriate shape and thickness and placed on the parts of the specimen that require special attention. These folded pieces of paper do not need even to approximate in thickness the thickness of the fruit or branch next which they are placed; two or three folds of paper are almost always sufficient, the flexibility of the drier sufficing to equalize the pressure; and they do not interfere at all with the proper drying of the specimen. They also assist in drying without contact, discoloration or deformation large folded fern fronds or leaves which overlap when the specimen is placed in its folder. A single piece or sheet of newspaper inside the folder is also helpful in keeping smooth compound leaves or delicate ones which tend to shrivel or inroll on the edges in drying. The principal advantages of this method are its entire freedom from expense and its greater adaptability to the requirements of individual specimens.—S. F. BLAKE, Bureau of Plant Industry, Washington, D. C.

<sup>1</sup> *RHODORA* **34**: 247–249. 1932.